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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/662,372	09/16/2003	Hisashi Kobayashi	D-21,289	9409
27182	7590	04/11/2007	EXAMINER	
PRAXAIR, INC. LAW DEPARTMENT - M1 557 39 OLD RIDGEBOURY ROAD DANBURY, CT 06810-5113			COCKS, JOSIAH C	
			ART UNIT	PAPER NUMBER
			3749	
SHORTENED STATUTORY PERIOD OF RESPONSE		MAIL DATE	DELIVERY MODE	
3 MONTHS		04/11/2007	PAPER	

Please find below and/or attached an Office communication concerning this application or proceeding.

If NO period for reply is specified above, the maximum statutory period will apply and will expire 6 MONTHS from the mailing date of this communication.

<b>Office Action Summary</b>	<b>Application No.</b>	<b>Applicant(s)</b>
	10/662,372	KOBAYASHI ET AL.
	<b>Examiner</b>	<b>Art Unit</b>
	Josiah Cocks	3749

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

#### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

#### Status

- 1) Responsive to communication(s) filed on RCE and amendment filed 1/30/07.
- 2a) This action is FINAL.                    2b) This action is non-final.
- 3) Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

#### Disposition of Claims

- 4) Claim(s) 1-20 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) Claim(s) \_\_\_\_\_ is/are allowed.
- 6) Claim(s) 1-20 is/are rejected.
- 7) Claim(s) \_\_\_\_\_ is/are objected to.
- 8) Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

#### Application Papers

- 9) The specification is objected to by the Examiner.
- 10) The drawing(s) filed on 9/16/2003 is/are: a) accepted or b) objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

#### Priority under 35 U.S.C. § 119

- 12) Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) All    b) Some \* c) None of:
1. Certified copies of the priority documents have been received.
  2. Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  3. Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

#### Attachment(s)

- |  |   |
|--|---|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892)   | 4) <input type="checkbox"/> Interview Summary (PTO-413)           |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | Paper No(s)/Mail Date. _____                                      |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 5) <input type="checkbox"/> Notice of Informal Patent Application |
|  | 6) <input type="checkbox"/> Other: _____                          |

**DETAILED ACTION**

***Continued Examination Under 37 CFR 1.114***

1. A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on January 30, 2007 has been entered.

***Claim Objections***

2. Claims 1-20 are objected to because of the following informalities:  
  
In regard to claims 1 and 10, it appears the added limitation "where said fuel emerges into from the burner..." in the third to last line of each claim should read "where said fuel emerges from the burner".  
  
Appropriate correction is required.

***Drawings***

3. The drawings filed 9/16/2003 are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims.

The examiner notes that as found in paragraph [0051] (p. 20) of applicant's specification, "[w]hile the drawings illustrate the preferred embodiment, which is feeding the nitrogen

enriched, oxygen depleted stream to the over fire air ports, advantages can also be realized by feeding that stream where the secondary or tertiary combustion air is fed.”

Therefore, the steps of adding the nitrogen-rich gas into “said means for feeding primary air” into said combustion, “into said means for feeding secondary air into said combustion, or into the interior of said combustion device from between where said fuel emerges into from the burner and where secondary and tertiary air emerge from said burner” recited in claims 1 and 10, must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as “amended.” If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either “Replacement Sheet” or “New Sheet” pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

***Claim Rejections - 35 USC § 103***

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

5. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

6. Claims 1-7, 9, 10-16, 18, and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent No. 4,586,443 to Burge et al. ("Burge") in view of U.S. Patent No. 6,282,901 to Marin et al. ("Marin").

Burge discloses in the specification and figures 1-21 an invention in the same field of endeavor as applicant's invention and similar to that described in applicant's claims 1-7, 9, 10-16, 18, and 20. In particular, Burge shows a combustion method that reduces the amount of NOx emitted including: providing a combustion device (10), and feeding primary air/oxidizing gas (either the air through inlet 23, see Fig. 1, or the air added through line 158, see Figs. 13 and 14)

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and fuel (63) into the device through a burner that comprises means for feeding secondary air (see inlet 24 and at least col. 16, lines 15-30) and tertiary air (see inlet 96 and at least col. 18, lines 9-41)) into the device. Burge notes that the oxidizing gas supplied to the combustion device may be air or pure oxygen (see col. 3, line 63) and that, dependent upon the type of fuel utilized, a nitrogen-rich stream may be introduced into the device as a carrier gas (see item 152, Fig. 13) which is conveyed with air and pulverized fuel through line (158) to chamber (21) (see at least col. 20, lines 23-27).

In regard to steps E of claim 1 and step F of claim 10, Burge clearly shows that the nitrogen rich stream (see nitrogen source, 152, Fig. 13) is added to the pulverized fuel in hopper (145) and to an air stream (from source 159, Fig. 13) and is then conveyed to chamber (21) through line (158) (see Fig. 14 and col. 20, lines 23-27). The air stream is properly considered to be a stream of primary air as recited. Accordingly, Burge clearly shows that the nitrogen rich stream is at least added "into said means for feeding primary air" as recited.

Further, as the nitrogen added from the source (152) is conveyed to chamber (21) through inlet (25) (see Fig. 8) along with the fuel, Burge is considered to disclose that the nitrogen-rich stream is at least added "into the interior of said combustion device from between where said fuel emerges from the burner and where secondary and tertiary air emerge from the burner" as recited in that the nitrogen-rich stream added with the fuel before the introduction of the secondary and tertiary air is considered to be added "between" the introduction of these air streams.

The examiner considers that any of the primary, the secondary or tertiary oxidizing gases (which as noted above may be pure oxygen) may be considered the oxygen-rich stream provided

into the flame. Alternatively, Burge clearly teaches that “make-up” oxygen may be provided to the combustion device with a stream of air based on the specific nature of the fuel supplied (see col. 21, lines 3-7). This “make-up” oxygen may also be considered to be the oxygen-rich stream described in applicant’s claims.

In regard to at least claim 10, the source of oxidizing gas (65) is properly considered to be from a source other than the burner.

Burge possibly does not disclose that the air supplied is specifically separated outside the combustion device into an oxygen-rich stream and a nitrogen-rich stream or that a portion of flue gas is fed with the nitrogen-rich stream.

Marin teaches in Figures 1-4 a combustion method that is considered to be analogous art to both applicant’s invention and Burge. In Marin, an air stream is separated into an oxygen-rich and nitrogen rich stream with the oxygen rich stream is feed with the fuel into a combustor flame and the entirety (100%) of a nitrogen rich stream is fed into a combustion device (see col. 4, lines 21-53). The nitrogen rich steam may be fed with a flue gas stream to the combustion device (see at least col. 8, lines 41-44).

In regard to the limitations that the air is separated into as gas stream “consisting of oxygen-rich gas” and a gas stream “consisting of nitrogen-rich gas” (e.g. claims 1 and 10) these recitations are considered present in the combination of Burge and Marin. As shown particularly in Figs. 13 and 14 of Burge, a nitrogen gas source (152) is shown feeding nitrogen gas to a combustor and an air source (159) (which may be pure oxygen, col. 3, line 63) is fed to the combustor. A separate fuel source (183) is fed to the combustor through valve (150). Each of these nitrogen gas and oxygen streams identified in Burge is considered to “consist” of oxygen-

rich gas and nitrogen-rich gas as claimed by applicant. A person of ordinary skill in the art would understand these nitrogen and oxygen gas streams to be desirably generated through external separation of an air stream in the manner taught by Marin (see at least col. 4, lines 21-53).

Therefore, in regard to claims 1-7, 9, 10-16, 18, and 20, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate the air separation taught by Marin as this air separation process is recognized in the art as a means to produce separate nitrogen and oxygen rich stream which when fed to a combustion device aid in reducing undesirable gaseous emissions into the atmosphere (see Marin, col. 4, lines 9-14).

7. Claims 8 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Burge in view of Marin as applied to claims 1 and 10 above, and further in view of U.S. Patent No. 4,257,763 to Reed ("Reed").

Marin in view of Burge teach all the limitations of claims 8 and 17 except that water is fed with the nitrogen-rich stream.

Reed teaches a low NO<sub>x</sub> burner and method of combustion using the burner that is considered to be analogous art to both applicant's invention and Burge. In Reed, liquid water (70) is supplied to mix with an air stream (see col. 4, lines 45-48).

Therefore, in regard to claims 8 and 17, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate adding liquid water to an air stream of a combustor as taught in Reed for

the desirable purpose of providing NOx reduction when combusted (see Reed, col. 4, lines 48-60).

8. Claim 19 is rejected under 35 U.S.C. 103(a) as being unpatentable over Burge in view of Marin as applied to claim 10 above, and further in view of U.S. Patent No. 5,809,910 to Svendssen (“Svendssen”).

Burge in view of Marin teach all the limitations of claim 19 except possibly for injecting a reducing agent that reacts with NOx to form N<sub>2</sub> for NOx reduction.

Svendssen teaches a combustion method that is considered analogous art to both applicant's invention and Burge. In Svendssen, a reducing agent (3) is injected that functions to reduce NOx emissions from a combustion device (see at least col. 3, line 59, through col. 4, line 5).

Therefore, in regard to claim 19, it would have been obvious to a person of ordinary skill in the art at the time the invention was made to modify the combustion method of Burge to incorporate injecting a reducing agent as taught in Svendssen to reduce the emission of undesirable compounds, such as NOx, during the combustion process (see col. 3, line 59, through col. 4, line 5).

#### *Response to Arguments*

9. Applicant's arguments filed 1/30/2007 have been fully considered but they are not persuasive.

Applicant argues that neither Burge nor Marin teach adding a nitrogen-rich stream “into” or “in” the combustion device (See response, pp. 8-9). The examiner respectfully disagrees.

In response, the examiner notes that the nitrogen that is added from the nitrogen source (152, Fig. 13), is mixed with pulverized fuel from hopper (145) and an air stream from source (159) and is conveyed through line (158) (see Fig. 14) into the reaction chamber (21) (see at least col. 20, lines 24-27). Accordingly, Burge does clearly disclose that a nitrogen-rich stream is added “into” or “in” the combustion device.

Applicant also appears to again broadly argue that the prior art does not show the step of separating air into an oxygen-rich and nitrogen-rich stream. The examiner respectfully disagrees.

In response, the examiner notes that it has been held that for rejections made under 35 U.S.C. § 103, the proper inquiry should not be limited to the specific structure shown by a reference, but should be into the concepts fairly contained therein, with the overriding question to be determined being whether those concepts would have suggested to one skilled in the art the modification called for by the claims. See In re Bascom, 230 F.2d 612, 614, 109 USPQ 98, 100 (CCPA 1956). Further, a reference must be considered not only for what it expressly teaches, but also for what is fairly suggests (*In re Burckel*, 592 F.2d 1175, 1179, 201 USPQ 67, 70 (CCPA 1979); *In re Lamberti*, 545 F.2d 745, 750, 192 USPQ 278, 280 (CCPA 1976)), as well as the reasonable inferences which the artisan would logically draw from the reference. See In re Shepard, 319 F.2d 194, 197, 138 USPQ 148, 150 (CCPA 1963).

With this in mind, the examiner notes while Burge does not show how or from where the nitrogen from source (152) is obtained, as noted above, Marin has been relied upon to show that

it is understood in the combustion device art that streams of oxygen rich and nitrogen rich streams may be obtained from an air separation process for use in a combustion device.

Accordingly, the examiner considers that the a skilled artisan would reasonably and fairly infer that the oxygen streams and nitrogen streams described in Burge would be obtained through known processes, such as that of air separation, as taught in Marin.

Applicant has not separately argued against the references of Reed and Svensson.

Applicant has simply asserted that these references do not remedy the alleged deficiencies of the combination of Burge and Marin. For the reasons noted above, the examiner respectfully asserts that the combination of Burge and Marin does not have the deficiencies asserted by applicant.

Therefore, Reed and Svensson are considered to properly show that for which they have been cited.

Accordingly, applicant's claims are not considered to patentably distinguish applicant's invention over the prior art of record.

### ***Conclusion***

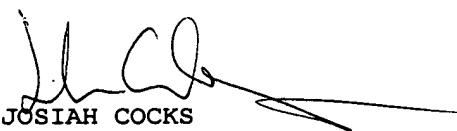
10. This action is made non-final. A THREE (3) MONTH shortened statutory period for reply has been set. Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Josiah Cocks whose telephone number is (571) 272-4874. The examiner can normally be reached on M-F 8:00-5:30.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Ken Rinehart, can be reached on (571) 272-4881. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000..

jcc  
April 9, 2007



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PRIMARY EXAMINER  
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